AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A speech encoding apparatus comprising:

a spectral envelope information encoding ~~means~~ unit for extracting spectral envelope information on an input speech, and encoding the spectral envelope information;

an excitation information encoding ~~means~~ unit for, by use of said spectral envelope information extracted by said spectral envelope information encoding ~~means~~ unit, determining adaptive excitation code, fixed excitation code, and gain code with which an encoding distortion of a synthesized speech to be generated is minimized; and

~~multiplexing means~~ a multiplexer for multiplexing said spectral envelope information encoded by said spectral envelope information encoding ~~means~~ unit and said adaptive excitation code, said fixed excitation code, and said gain code each determined by said excitation information encoding ~~means~~ unit so as to output speech code;

wherein said excitation information encoding ~~means~~ unit includes:

a fixed excitation encoding ~~means~~ unit for evaluating encoding distortions of fixed code vectors stored in a plurality of fixed excitation code books to determine said fixed excitation code;

a first periodicity providing ~~means~~ unit for, when said encoding distortions of said fixed code vectors are evaluated, emphasizing periodicity of a fixed code vector output from at least

one fixed excitation code book by use of a first periodicity emphasis coefficient adaptively determined based on a predetermined rule; and

a second periodicity providing ~~means~~ unit for emphasizing periodicity of a fixed code vector output from at least one fixed excitation code book by use of a ~~predetermined~~ fixed second periodicity emphasis coefficient.

2. (Currently Amended) A speech encoding method comprising:

a spectral envelope information encoding step of extracting spectral envelope information on an input speech, and encoding the spectral envelope information;

an excitation information encoding step of, by use of said spectral envelope information extracted by said spectral envelope information encoding step, determining adaptive excitation code, fixed excitation code, and gain code with which an encoding distortion of a synthesized speech to be generated is minimized; and

a multiplexing step of multiplexing said spectral envelope information encoded by said spectral envelope information encoding step and said adaptive excitation code, said fixed excitation code, and said gain code each determined by said excitation information encoding step so as to output speech code;

wherein said excitation information encoding step includes:

a fixed excitation encoding step of evaluating encoding distortions of fixed code vectors stored in a plurality of fixed excitation code books to determine said fixed excitation code;

a first periodicity providing step of, when said encoding distortions of said fixed code vectors are evaluated, emphasizing periodicity of a fixed code vector output from at least one

fixed excitation code book by use of a first periodicity emphasis coefficient adaptively determined based on a predetermined rule; and

a second periodicity providing step of emphasizing periodicity of a fixed code vector output from at least one fixed excitation code book by use of a ~~predetermined~~ fixed second periodicity emphasis coefficient.

3. (Original) The speech encoding method as claimed in claim 2, wherein said speech encoding method analyzes said input speech to determine said first periodicity emphasis coefficient.

4. (Original) The speech encoding method as claimed in claim 2, wherein said speech encoding method determines said first periodicity emphasis coefficient from speech code.

5. (Original) The speech encoding method as claimed in claim 4, wherein said speech encoding method decides a state of a speech, and determines said first periodicity emphasis coefficient based on the state decision result.

6. (Original) The speech encoding method as claimed in claim 5, wherein said speech encoding method determines a fricative section in a speech, and decreases an emphasis degree of said first periodicity emphasis coefficient in the fricative section.

7. (Original) The speech encoding method as claimed in claim 5, wherein said speech encoding method determines a steady voice section in a speech, and increases an emphasis degree of said first periodicity emphasis coefficient in the steady voice section.

8. (Original) The speech encoding method as claimed in claim 2, wherein, based on noise characteristics of fixed code vectors stored in the fixed excitation code book, said speech encoding method applies either said first periodicity providing step or said second periodicity providing step to the fixed excitation code book.

9. (Original) The speech encoding method as claimed in claim 2, wherein, based on power distribution of fixed code vectors in terms of time stored in the fixed excitation code book, said speech encoding method applies either said first periodicity providing step or said second periodicity providing step to the fixed excitation code book.

10. (Currently Amended) A speech decoding apparatus comprising:

a separating ~~means~~ unit for separating speech code into spectral envelope information and excitation information including adaptive excitation code, fixed excitation code, and gain code;

a spectral envelope information decoding ~~means~~ unit for decoding said spectral envelope information separated by said separating ~~means~~ unit; and

an excitation information decoding ~~means~~ unit for decoding excitation signal from said adaptive excitation code, said fixed excitation code, and said gain code separated by said separating ~~means~~ unit;

wherein said excitation information decoding ~~means~~ unit includes:

a fixed excitation decoding ~~means~~ unit for, from among fixed code vectors stored in a plurality of fixed excitation code books, extracting a fixed code vector corresponding to said fixed excitation code;

a first periodicity providing ~~means~~ unit for, when said fixed code vector corresponding to said fixed excitation code is extracted, emphasizing periodicity of a fixed code vector output from at least one fixed excitation code book by use of a first periodicity emphasis coefficient adaptively determined based on a predetermined rule; and

a second periodicity providing ~~means~~ unit for emphasizing periodicity of a fixed code vector output from at least one fixed excitation code book by use of a ~~predetermined~~ fixed second periodicity emphasis coefficient.

11. (Currently Amended) A speech decoding method comprising:

a separating step of separating speech code into spectral envelope information and excitation information including adaptive excitation code, fixed excitation code, and gain code;

a spectral envelope information decoding step of decoding said spectral envelope information separated by said separating step; and

an excitation information decoding step of decoding excitation signal from said adaptive excitation code, said fixed excitation code, and said gain code separated by said separating step;

wherein said excitation information decoding step includes:

a fixed excitation decoding step of, from among fixed code vectors stored in a plurality of fixed excitation code books, extracting a fixed code vector corresponding to said fixed excitation code;

a first periodicity providing step of, when said fixed code vector corresponding to said fixed excitation code is extracted, emphasizing periodicity of a fixed code vector output from at least one fixed excitation code book by use of a first periodicity emphasis coefficient adaptively determined based on a predetermined rule; and

a second periodicity providing step of emphasizing periodicity of a fixed code vector output from at least one fixed excitation code book by use of a ~~predetermined~~ fixed second periodicity emphasis coefficient.

12. (Original) The speech decoding method as claimed in claim 11, wherein said speech decoding method decodes said first periodicity emphasis coefficient from code of a periodicity emphasis coefficient included in speech code.

13. (Original) The speech decoding method as claimed in claim 11, wherein said speech decoding method determines said first periodicity emphasis coefficient from speech code.

14. (Original) The speech decoding method as claimed in claim 13, wherein said speech decoding method decides a state of a speech, and determines said first periodicity emphasis coefficient based on the state decision result.

15. (Original) The speech decoding method as claimed in claim 14, wherein said speech decoding method determines a fricative section in a speech, and decreases an emphasis degree of said first periodicity emphasis coefficient in the fricative section.

16. (Original) The speech decoding method as claimed in claim 14, wherein said speech decoding method determines a steady voice section in a speech, and increases an emphasis degree of said first periodicity emphasis coefficient in the steady voice section.

17. (Original) The speech decoding method as claimed in claim 11, wherein, based on noise characteristics of fixed code vectors stored in the fixed excitation code book, said speech decoding method applies either said first periodicity providing step or said second periodicity providing step to the fixed excitation code book.

18. (Original) The speech decoding method as claimed in claim 11, wherein, based on power distribution of fixed code vectors in terms of time stored in the fixed excitation code book, said speech decoding method applies either said first periodicity providing step or said second periodicity providing step to the fixed excitation code book.